(54) METHOD OF TREATMENT OF TOOTH HARD TISSUES BY LASER RADIATION AND DEVICE FOR ITS REALIZATION

(57) Abstract:

FIELD: medical equipment, applicable in stomatology at treatment of caries and dental prosthetics.   SUBSTANCE: the method consists in action of laser pulseon the tooth tissue,   acoustic   pulse   arising   at interaction of radiation   with the tissue is detected,   and the type of the tissue to be treated is determined according to the pulse   peak amplitude. The device uses a pulsed laser and means for delivery of radiation from the laser to the tooth arranged in succession from the laser to the tooth   arranged in succession in the optimal axis; the input of the means of radiation   delivery is optically integrated   with the laser output, has an acoustic pickup   and an electric pulse peak amplitude meter, whose input is electrically coupled to the acoustic pickup output, and the output is electrically coupled to the display   unit input; the acoustic pickup is installed in such a manner that the direction of its maximum sensitivity makes up angle a with the direction of the optical axis   at   the   output   of   the   radiation   delivery   means,   this   angle   satisfies condition: $11° < d < e6°$. EFFECT: reduced danger of laser injury to patient. 6 cl, 5 dwgr

(21) Application number: 94012665

(22) Date of filing: 19940411

(51) Int. Cl: A6105/00   A61N5/06

(56) References cited:
1. Harem⁵ CILIA N 4521194. Kn. A 61 C 5/00. 1986. **2. ABTopcKoe CBHACTCnbCTBO** CCCP N 1593669, Kn. A 61 C 5/00, 1990. **3. WO,** naTeHT, 89/08432, Kn. A 61 **C 5/00, 1989.** 4. WO, naTeHT, **90/01907,** Kn. A 61 C 5/00, 1989.

(71) Applicant: **YLie6Ho-HayYHo-npoH3BOJ;cTBeHHbILI** "JIa3epmbIiI ueHTp" I4HCTHTYTa **TO¶HOL McXaHHKH H OHTHKH**

(72) Inventor: AnbTIuynep Г'.B., BenHKoB A.B.. Epo4ieen A.B., AnbTnrynep Г'.B., **BeJIHKOB A.B.,** Epocpeen A.B.,

(73)Proprietor: **Yue6HO-Hay^Ln o-IIpoH3BOJlcTBeHHbI2 "Ha3epHbiti** ueHTp" MHCTHTYTa **TO^IHO2 McXaHHKH 11 OHTHKH**

(54) СПОСОВ ОВРАВОТКI4 ТВЕРJjbIX ТКАHEYI 3УВА JIA3EPHbIM 143JIY^IEHI4EM 14 УСТРОLICTBO JIJI51 ErO OCYIi(ECTBJIEHYI5I

(57) Abstract:

I43o6peTenne ОТНОСНТСН К Me,HHIH4HCKOLI ТСХHHKe H MO?KCT 6bITb BCHOnb3OBaHO B CTOMaT0M0PHH npa negeHHH Kapaeca **B** HpOTe3HpOBaHHH 3y60B. ОСНОВНbIM HeJ;OCTaTKOM 143BCCTHbIX СIIOCO60B 06pa6OTKH ТВepJjblX ТКаHeh 3y6a **na3epHbIM В3nyHeHHeM B ycTpoilcTB, peanH3yion4Hx 3TH СnoС06bI,** HBnHCTCH BbICOKaSI OnaCHOCTb HaHeCeHHH na3epnoi TpaBMbi nau eHTy. Llenblo **H3o6peTeHHSi HBnHeTCH CHHIKeHHe OnaCHOCTH HaHeceHHSI** nauiieHTy na3epuofl ТpaHMbI 3a с^IeT o6ecneueHHH B03MO?KHOCTH onpegenem ТHna o6pa6amiBaeMOiI ТКaHH. УКa3anHasi Ijenb J;ocTHrae'rcsi -rem, ^Ltro B cnoco6e 06pa6oTKH ТВCpgbIX ТКaiiel/1 3y6a na3epHbIM H3nyueHHeM, HKnIO^IaionjeM **B031telaeTBHe Ha** ТКaHH 3y6a na3epHOrO HMnynbCa, perHCTpupuloT aKyCTH^IeCKH11 HMIIynbc, B03HiiKalO114HLI HpH **B3aHMOJ;eiiCTBHH H3ny^IeHHSI** с ТКaIIbiO, no HHKOBOLI aMIIfHTy/de **KOTOpOrO** onpegenHIOT ТHH o6pa6amiBaemoii ТКaHH. УКa3aHHasI ikenb ТaK?Ke J(ocTHraeTcH 'rem, ^Ltro ycTpo2CTBO JjnH o6pa6oTKH ТВepJ[b1X ТКaHeiI 3y6a na3epHbiM vl3nyuenvleM, СОСТ051I ee 113 **noCneJIOBaTenbHO paCnonolKeHHbIX** B) Onb OnTH^IeCKOii OCH **HMriynbCHOro** na3epa H cpej cТBa gOCTaBKH LI3ny^IeHHSi ОТ na3epa К 3y6y, **BXOJ[KOTOpOrO 01ITH^IeCKH** conpSui eii с BbIXO) OM na3epa, СОgep?КНT aKyCTH^IeCKHLI **npHeMHHK** H **B3MepHTenb HHKOBON aMIUIIITygbl 311eКТpII4eCКНХ HMIHynbCOB,** BXOJ; **KOTOpOrO** 3neKTpH^IeCKH СОnpH?КeH С BbIXOgOM aKyCTH^IeCKOrO npHeMHHKa, a **BbIXOJj** 3nCKTpH^ICCKH СОHpH?КeH **со** BXOJ(OM yCTpOiICTBa 1/liIJ;HKaI1 ₕI₁/₁, npH^IeM aKyCTH^IeCK1I1 npHeMHHK yc'raHOBneH ТaКBM o6pa30M, ^Ltro HanpaBneHHe ero MaКCYIManbHO2 ^IyBCTBHTenbHOCTLI СОСТaBnHeT с HanpauneHHeM ОHТHLIecKOI2 ocn Ha BbIXOgC Cpe);CTBa AOCTaBKH H3ny ⁴ICH1451 ОТ na3epa К 3y6y yrOn a , yJlOBneTBOpHIoIi i4I ycnoBHIo: >.i° < d < **86 .** 2 c. H 4 3.114-nbl, 5 rm.

Description [Onncautie H3o6peTeHJst]:

I/13o6peTeaue **OTHOCHTCH K McJ(HIWHCKOi1 TeXHHKe H** MO?KeT **6bITb HCIIOJIb30BanO** B cToMaTonornH npH ne**'leHHH** KapHeca **H npOTC3HpOBaHHLI** 3y6oB.

1'13BeCTeH cnoco6 **yjaneHHH xauanbHblx KapHO31lb1X UOBpe2KJjeHHi1 H/HJIH** KaMHeil 3y6a (naTeHT USA 4521194, A 61 C 5/00, **npHOpHTeT 22.12.83 r.),** BKnlotlalonglil o6pa6oTKy TBepJ;b1X TKaHCii 3y6a HMnynbCHbIM na3epHbIM 113nyueHHCM. OCHOBHbIM HeX(OCTaTKOM J;aHHOrO cnoco6a HBIIHeTCH BbICOKaH OnacnocTb HaneCeHHH na3epaoiil TpaBMbI npH o6pa6oTKe TBepJlb1X TKaHeil 3y6a.

Han6onee *6II* 3KHM no TeXHH **'leCKOI'I** *C* U IOCTH H npMHHTbIM 3a npOTOTHn HBnHCTCH cnoco6 neueHHH HeOCnO)KHeHHOrO xapneca (a. *C.* **CCCP** N 1593669. A 61 C 5/00, **npHOpHTeT** 14.11.85 r. ony6n. 23.09.90 r. B14 N 35), BKnloualOII10 o6pa6oTKy TBCp)>ibIX TKaHeil 3y6a na3epHbIM B37IyueHHCM *c* JjfHHOLI BOJIHbl **2,94** *MKM.* JpiwTeni,HOCTblO HMnyJIbCOB **100-500** MKC, **MOIHHOCTbIO** 0,5-1,0 JI2K/HMn, **IUIOTHOCTbIO** MOU **ROCTH** $2 \cdot 10^4 + 3 \cdot 10$ BT/CM^2, uacToToii 1 1'ij, 3KCH03HIMCII 3-30 c. **OCHOBHbIM HegOCTaTKOM TIpOTOTHna HBnneTCH OnaCHOCTb HaHeCCHHH na3epHOYI TpaBMbI npH** o6pa6oTKe TKaBCIr1 3y6a, **CBH3aHHan** c oTCyTCTBHCM B npoTOTHnC npoltepypbI **Onpej;eneHnSI** THna o6pa6aTBIBaeMOY1 TKaHH.

I/I3neeTHo **yCTpONCTBO** J;nH 06pa6oTKH TBC) blx TKaHCi1 3y6a na3epHbIM n3nyue1n4eM (naTeHT **WO 89/08432, A 61 C 5/00,** npHOpHTCT 10.03.89 r.), BKnno^{g}alonkee nocneJ(ouaTenbno **pacnono}KeHHble BJIOnb OUTH'leCKO$ OCH HMl1ynbCHbl$** na3ep H cpeJICTBO **,HOCTaBKH** 143ny**'ICHHH K** 3y6y B BHJie OIITH^l**IeCKOrO BOJIOKHa. OCHOBHbIM HCJIOCTaTKOM JjaHHOro yCTpOLICTBa HBnHeTCH** BbICOKaR onacnoc'rb **HaHCCeHHH na3epHOYi** TpaBMbI **npH** o6pa6oTKe TBep,gbIX TKaHeil 3y6a.

Han6onee 6JIH3KHM no **TeXHHUeCKoii CyUHOCTH H npHHHTbIM** 3a **IIpOTOTHII BBf\$ICTCH** yCTpOLICTBO gym o6pa6oTKn TBepJIbIX TKaHeii 3y6a na3epHbIM **H37IyueHHeM** (na'renT WO 90/01907. **A 61 C 5/OO,** npWOpHTeT 25.08.89 r.), cogepxtatnee IIocneJSonaTej1bHo pacnono}KeHHbie BJJonb onTHUecxoit OcH **HMfynbCHbIi2** na3ep H cpeJIcTBO JjOCTaBKH H3nyueHHB K 3y6y, BKnloualcuI ee OTpe3oK OHTH^l**ICCKOrO BOnOKHa, BXOJj KOTOpOr0** OBTvi ieCKH cOnpH?KeH *C* BbixonoM na3epa, vi **HaKOHC**^{l}**IHHK, BXOJI KOTOpOrO** onTHUecKH **conpn2Kelt** c BbiXO) OM OHTHUCCKOrO BOJIOKHa, a **BbIXOJ(HBnHeTCH** BbixonoM ycTpovlcTBa. **OCHonnbIM HC) OCTaTKOM** npOTOTHna **HBnHCTCH** onacHocTb **HaHeCeHHH** na3epHo i TpaBMbI npn o6pa6oTKe TKaneLl 3y6a, cBH3aHHan c oTcyTcTBHeM B npOTOTHne CHCTeMbI onpegeneHHH T1/Ina o6pa6aminaeioi TKaHH.

3aJjaueii, Ha pemeHHe KoTopoia Hanpanneno 3annnHeMoe H3O6peTeHne, HBnneTcH CHvoKeHVte onaciiocTB HaHeceHnn nai vleuTy na3epHoii TpaBMbi 3a cueT o6ecneueHHH BO3MO?KHOCTII onpej;enein5 THna o6pa6aTbIBaeMoii TKaHH.

YKa3aviHas 3a) aua j ocTnraeTcn TeM, wTo B cnoco6e o6pa6oTKH TBep) blX TKaHeil 3y6a na3epHbIM **H3JIyueHHeM,** BKJHoualou;eM BO3) eiiCTBHe Ha TKaHH 3y6a na3CpHOrO HMnynbCa, perucTpvipyioT aKyCTHUCCKHii HMnynbC, BO3HHKalonjLn\$ npH B3anmoneilcTBHH H3ny**'**leHHH c TKaHbIO, no nuKo8o1i aMIUIHTy) a KoToporo onpegem noT THn o6pa6aTbIBaeMOLI TKaHH. **AnH HOBbImCHHH J;OCTOBepHOCTH OnpeJleneHHH THna o6pa6aTbIBaeMOi1 TKaHH yKa3aIHbliI** aKycTH^t**leCKHLI HMIIynbC perHCTpHpylOT B J;Hana30He 3ByKOBbIX** ^{t}**iaCTOT 85-95 KI'g. C TOLL ?KC U,enbIO** o) HOBpeMeHHO *C* perHCTpall,Heii aKyCTHUeCKOro HMIIyYIbCa H3MCpHIOT BpcCMCHHyIO 3agepnKKy Me?Kpy na3epHbIM H aKyCTH^t**ICCKHM HMIrynbcaMH,** nO BenHUHHe KOTOpOlii yTO^{t}nIHJoT THn o6pa6aTbIBaeMOil TKaHH.

YKa3aHHa5 3aJ;aua TaK?Ke JjOCTHraeTen TCM, *4TO* ycTpoilcTBO J>nH o6pa6oTKH TBep);bIX TKaHeii 3y6a na3epHbIM n3JIyuerneM, cocTo5In ee H3 HOCneJ(OBaTeJIbHO pacnono?KeHHb1X BJ;Onb OHTHUeCKOi1 OCH HMlIynbcHOro na3epa H Cpeg;CTBa JIOCTaBKH H31Iy**'**leHH51 *OT* na3epa K 3y6y, BXOJj KOTOpOI'O OHTHUecKH COnpH?KCH *c* BbIXOgOM na3epa, COJ;ep?KHT aKyCTH **'ICCKHLI npHeMHHK** H H3MepLTeJIb nIKOBOil aMnnHTyJ(bI 3nCKTpH^t**ieCKYIX HMIIynbCOB,** BXOJj KOTOpOro oneKTpunecKAi conpH?KeH *Co* **BXOJ;OM yCTpOLICTBa HHJIHKaUHH,** npHUeM aKycTnuecKHi4 npIIeMHHK ycTaHOBneH TaKHM O6pa3oM, ^{t}**ITO HanpaBneHHe** ero

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UX!56 Olt **98** .LO .LOS.oah 33ouOU H Ea411itIU'414 0.I0x33na LoltxL' Ed,Lxauo AitiI 14ICIBYE otdaoxau .Lotuclaw£H H EO4u/tuwn O.IOMOahH.LO/txE (3HHEaO£Ed9o3du-ag$_{dAtcp}$ 'dalvaduaH) 3HHEa0£Ed9oadu aon^c radxxauo d,Htloacaod] •Ea4uAAIU^{A}IH o.IoHda£Ei EIfehEH oH4uad,Ha0H,Lo Ea41161u~IH o.I03133haLo ^{3E} EIfehEH lt1131cdaY1E£ .Loral ildltadup •ao ^{q}ultuNU4 o.E03133hada4cME ALCEhEH LIHlHOI1tHS.O,L2HJAO0 'HHa^{P}lada .LHMOIAI ,LouidazMH4 H 'e3auguilH 0.IOMoaha.I oA3Ia **AllLmuI n** outaoxau doladaNN£I/I °iioxaawaudu NIHxO3hH.Lo&3l i4HO£ 1.I0NI3Ehtt1190 H£I411ga I414HHa)aououood .LOI/tdad.LOH.Iad 3^c**utifl** pNH 14H)IO3ha.L3tt31a .I.O.Le •34ultu is 1/I14M3ahH.L3tt311 .Laaxaa£oa Hu rw nau3m td£Ed adf j •ttuahaH 0.13 aaluoL aLO•L3H.LOOa 'auawada .LH3lIOYsl ,LOLtdmoxH4 H O4uttu is HIgada£EU .Lo Adad.Loajad NIH.Le 3 ouxal^{A}Iadaoallp •I4ifmmle Eli£Ed$_{9,0}$ o.Iol hoaodgaICEx 4.LOoaxdaaou $_{otfixt}$aBal%Lu ed90 EH d,otuuaeduau 14xa1daoll oaa,allada £3dan 'IVoda£Eu Nu4H34ukmrn 3oJ 1aMadaHa,l '3HHahAu£H 0.IO.Le aI3OII °EHII LH3lt HUtf xIcHHO1m.Le aad33he31 a $_L$ 11HIIEMHllHi4 3H,lal?odd,ag a d,otXda3xa41 °EHH Lu *1* HaJamAd£Ed mdu o.I31noraxa11£Oa 'Eag1 im a o.103133huLLo c) E I4lit(u,arn QE (3HO£EUEHlt u' oui•E£EaX a) 110H^g UEdd,313u3 HOHO311411 H HxxCdaltE£ 'I41tttLHUUNIE 140HOx14U H14H3hEHC•TJ31 *96* **Olt 88** .Lo .LO.L3Eh 3aouoa a Eo41Ltu1^{A}Ii oaoxa3h14,La[txE Ed.Lxauz Aicd,umir a oIttuOMHU d,olidaiY£I4 H Ea411faly a oJOxoahadaXxa (3HHaao£Ed9oadu-34dtt0 'dayinduBIi) 3aHEHO£Ed9o3du 3o14UEdd,x3U3 .LHtloa£Hodu *8* HHYIEd,L4I a4I 14 amiaao£Ed9o3du o.Ion4ICEd.LxauO 3x0119 $ •E34Ir u *NH* O.IoHda£EU EIfEhaH OH4u3,LHaOH.LO E3$^{⍓}$1rAImll4 0.I05133hadatcME arfehaII Xxaadalta£ .LoiHUaltaduo H0UeadaLH14 XI4HH3113da HnH3d3Ni£H 3310119 g •Ea4UttuN1a o.I05133ha.LOANE AuehaH aatuolttadadaad,000 'Hu 13d& .LHa1NOiv LotAdaax144 H aogifttuNai O.IOx33h14d a/t is ALGLHuuNIE oittaoxan d oaHdaNi£a *9* i'i t&LHICUNIE v_tOHOauu NI3113d,adaNI£I/I NI0aaHNI3adH NI113133hHd *3ICIM* I'HO£ 11ONIaEh/t1f90 14£1411914 NII^{g}HH33IO11O113Ed dAi1tdad.Londad a411&&IINIH 11Hx33hada1txe d.O,Le •34uAIINEH H1431zahHd3AA31E daarHH£oa EHH,LH3tl HHH3mAd£Ed adLI ItL[EhEH 0.13 I!IHIIIOGtadadaaLoo3 '11113NI3da d,H3INON1 d,oIAda3aa4 *6* HOUeadad,HH XIcHH3NI3da HH13dbwt£H 3310119 *0f* H 34u~im'u v_Hcada£EU d orAdaddaa.Iad pj Wodod,EddaH.13dodA4 **ILLS** 3 OHHa^{P}13da0Hlip •EHH.LHatt En£Ed90 0.I011oaOd9HUEx 4daouxdaaou 01EYMaI4d.E9'ed90 EH dAIHIfaeduaH $_⌐$MHHh3HOMEH H $_E$ OH3OUGH 3Ox33hId.UO 301110IEhOIU3la •?, Hxaad.3ott oad31tad3 £ad3h 'Nloda£Eu NI14H34u4tuwa aoiiaetdadaHaJ '3HH3hiAU£H oaoxe 3830['Huewe HHHam[td£Ed LIodou 3atuolltad.ad and oo3 'a14H3h1H£ aaluoIEml4Hadu 'j Eda£Eu HHhEdaH3.I HH.ld3ne 41t3aodit d,o18auuaauadait oaod,e ^{g}**ulf** _um,ollodd.olf Ed,xEdd, o.Ion^{q}uJ,LHdaji£a /txaod9Hriex xultoaodu NQauIHahutu£H NIi4Hda£EU e9A£ gauaxd, xlgltdaad, Hxd o9Ed90 NIOI1EhEH t13d3l •a9030u3 HHtia£HIread 14oud,adxHox danadU

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oLtaoaau 3,011fdoNi£j/j •NIoxH3h411£N N1I4Hda£EU E9A£ NHEa.L giotfdaa.L NNHomAd£Ed
Ndu $INlncrexNH£OH 'aqurAn is NNxaaha.Lo/txE .I.OLCdadl.aa tad •Eg/C£ NHEM.L Uolidaax

'IrEH.Im3 **vllrtx3ahNd.Lxaue** a xaLattcEdgoadn °**rvoxmHVVamdu** IHmM3 hm LOtjjE *O*.**Iovvaldlad.LJI** 1Jad 'E34UAUVVm 0.IO313ah11J3/CNE i^**IOLIEhEH** m 'rvodosuedJam,ladO.LOII) oJorlaAdmd.LJLI,Iad 'E34u[Cm m oJOHdacElr nOUEhEH IClixcara Exxcdalfuc aoireada.LHm xI°HHaraada aua.Ladaa4wa atfoxr a 11FI °g ExmHNlamdu 0.IO3133hLI.Labre N1o1 'OXI4a *3* HaWWISduo3 Y13133hwd.Lx3ue aOUEada.Lllm xIgfHarvada Kua.LadaNEa 1foxa vlOdo Lg •91-60 **Etrnd.IODUmll3o** o,loaod4 a i 3009 EH 6 aOUEadas,Hm xI4HHanada aua.Lmdarzem aoltoxa em nuullo 3 *Iu*°amaxclsduoa mxaahvld.Lxaue m j 11daeBU' Piolfoxtga *3* NI°**uIHaxczdu03 Id3133hH.LUO** 'Kr((D 1lttOm1l'OJ04) **acEg EH** 01 **dos,Bdaam.Iadotor)I** a,umcdatto3 on4Ira.LVIHUOuoh' oaLo od,L3A **ax[x11y** •9 **Edo.Lxa.Lat1** oaoaoxuu Ntolioxa **03 HaxcISduo3 ux3ahad.Lxaue** 11Oxi4a u 'g ExrnNamdu o **lox3ahLI.L3ttxE** IYoltoxi a **3 H33KISduo3 1113133haldLB3Ue** 1foxa o.Ia o.Lh 'NIOEEdgo **NIL13ML LII4H131E0H11J31C** '988 'j°.LNI **Edo33aYIodu 30119 11H** jzgnii aocalread 11 **a4dA(p** aIa **lraocudgoadu** aod.L3I4g amtnoLCe^quou3u 'g E03gLaI11111 **xux33hvld.Lxaue** mmt ud..,°um u **auxuaocEdgoadu o.Ion4IIEd.L31au3** mom) .Lmicdatfo3 OaJarlodJad oH4ua.LaH1r0II0 •da,a^PI.L4uoa vjoaodljvtn HEdgiga oaodo.Lox **3e.1,33h113I E 'G NlodO.LEMN1tHI2** 3 9 (do.Lxa.Lalf Yugao rnn) ao34utCuvam **xUxoahud.Lxaue** I41 **A.LUUUVV11** 150E0xmu qua r.,ndaNIOa eadan Ha aduo3 **aMDahud.Lxaue** EHo(4othn 13'oxI°Ig o8Z Uo.IA AgAc **EdacEU LO KvIHahtcucVI** HxrE.L3oti Ee.Ia11ad3 alioxl4s **EH** aoo **IIOx0ahILLllo rva11HoUaBdLI11H** 3 .**L31SUHE.L303** u.**L3OH4ud.LI4H.LOaAh** *I*UGH41feNIm33ren **O.Ia** 311HalcEreduEH **O.Lh** 'NOCEdg0 **mom.** r*I*^q**uHauaonu.Lo** '881tw8g mxdEN1 g Ho4 odxNNI HaWOlromard 14raa1ana vlatnolAdm fulolf, **axv4HhaHO)EH** *U* ;5OHHaxcoL1OU3Bd E3A310q *OJOH1* 'eC LO *Ivly* g{, **maHKO.L33Ed** '**Edacut i** oltoxI4a a uaxcuduoo 1/13133hILLUO **JHHahi IfCU vlxs11J,3011** Es.L311ad3 Ifoxa **1lmx3ahm.LUO** Nlahmdm *rave* gZ I'4aUHISO.L3aud ru Ha&xo(p **3 Am.1,ono oiAnoIAdI43Ax04 o.IaYIIExcdalfoa** E31mHh3HOx1111 m g .**EHMOU0a** o.maodm4UEa Excad.LO **xI**^q**uHaxciduoa 1113133hm.LUO** &sMO a011311110111411 Z A91Ce x 'edDEEu .Lo **umnahAucm** mxsE L3o1f oasal1ad3 •18['10:J,101/1 **EH** j **dacalr** rI4no icAunu Hudgi4s uaHahAClrcm **E31aHhO.L314** as.LaahEM g

•**NlalnaAValra** s .Lmo.Iao3 **Es.L3vjod.LoA ouovvauuatctc** aaaEeutread **r_foHS,adxllox** davmdu

°*L* 11mtIExm1tHm aaLouod.L31C NIOI(Oxa o3 Haxcaduo3 mxaahmd.Lxaue 1foxI4a a 'g **Exmlunaadu oJOx33hai31CiE** *wo1* oxzga a **Ha3ia}duo3** mx3ahmd.Lxaue **oJodO.LOx** *Ifoxs* Hodos,s 'aoueadaLHa **xi4HHaraadu** umnadaraem ExoLlg aoltoxa 0m 14IaH1111 3 Haxcxdnoa mxoahads xaue tfoxl°a u 'j adaeau *I*io (oxi4a a **Haxacduo3** 11x33hm.L110 Edos,Edsam IadosAtp **1toxa Ptahadu '01 dos,Edsam.Iados of** m **6** aoumsdasmu **xl4HIIaviada anuadawem** xoug (Taint, 'no) smxcdalfoa on°IraLmuuouolf os.IaaodaoA **unna.Ladgoem** I4ir wdotl) 9•11 Ojj

'*g* Edosxas,atf oaoaoxau Noltoxa o3 **Haxcuduo3** rIxoanads,xaue 1fo3I4a 11 'g **Exml'Iamdu o.101133hm.L31Cx11 rvottoxlga 3 Haxclsduo3 mxoanudJ,xaLle** 1foxa o.IO os *h* 'No0Edgo ramxaJ, *YII*^q**uHaUaOHBJ,3X** '*11,jx* 86-88 **ISUHExaAuodu** ao3ouou **3** 8 **maTlada,qum4** m **uauaaocadgoadu** o.Iongiiads,xau3 310119 (ja•.Im4 'v3) smxcdalloa oH4uas,mxarouolf oaL3zodJaA umuaJ,adgoem I4IrANldo4 g•U ou

•*L*, a '**riaxmtium raoaLoaOdJaA 3 H331cgduo3 mxoahmd.Lxaue 9 do.LxaLalf uI4aoxmu 0adah Exmurvamdu 1(oxt4a a** 'ornuornoa too3 /Cworvauuaua0 r_Im1nousdoaJ,auaolfc °**UO.LC AgAc** x adacaLc J,o u11HahAuem mxa11J3otf EEJa1fad3 Aroma EH moo IjOxaahms *uO* **NlaaHoLlaaduaH** 3 .LoISUHE.i303 I&LDOMu2.Lng.LoaAh °on^quenn3xary o.Ia aunauauduEH **OJ,h** 'NIOcadg0 ramxBJ, a aoaE.L3/C g xmluaamdu 14aMo3h11JaAC11d '17 aHHhoHOiEH m **BHH0uoa 0.I0x33haJ,uo xoead,Lo** ar'mHa3mououaed OH4uai.aao aLI30U NlrilnaacdattO3 'Z *ICgICO* x Edacau .Lo ISmHan/ar m maEaJaotf Noa *I* tfad3 03 Haxcuduo3 mx3ahm.LUO oaodos ox tfoxt4s '**j dacalr IaI4H34i[tCllrvm (8%114 'pm) J,Hmalatfo3 oa aodja/C amxasadgocm I4uAndo4)** js •u

•**JoxaoxmdL,m afU0axou** OH110I(31C 9-g•.II4~ EH **Examioadu o.I03133haLo** as HsaoaaauaadHEH ENII'11L'd.IEH)l •1multoc 110**MBm3d u11HaxcaLoo** (raa11EOU3/C NII4rvmtioxgoaa IS3.L31SLI3U ' o*98*) *p*) *OTT* :oiaaouag **LImtnousdoaJ,auaoti/C** *'D* LIO.LC **Agile** x Edacair JA ISaHahICucH I **aaJa01f EaJaltad3 at(oxI a EH** *1130* **IaOx3ahm.LU0** K212H3LIaadIrEH *3* J,3auua.L303 m L30H4ua taa LOELgh 11OH4uEra1133111NI **0.Ya amuoLcaaduEH OJ** h 'NIOOEdgo ramx.BJ, UIgH1113IIEOH11J3/C 'xaHNlamdu Hmx33ha LoAxa **o.Latnexadalfoo** 'Eajar_IodsaA u11tlxddJauox mmua Ladgoe11 raatxaosaau a **aaNaauBulladu** 'I'aOcadgO wmaBZ '11ua *L* **UO3133haJ31Cx11** YIa11mHada ao.LoaLCdtfadu0 o98 *1100* I~IOB33has,u0 ,LO **Bxaawamdu 0.I03133h11J31CME 11J OOH**°**Ira.LaE.L3H&h** goa^t uawaoaaw uuHauaeduau **IHHOH0LIMLO**
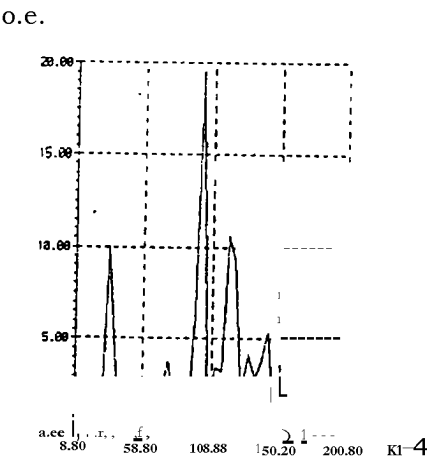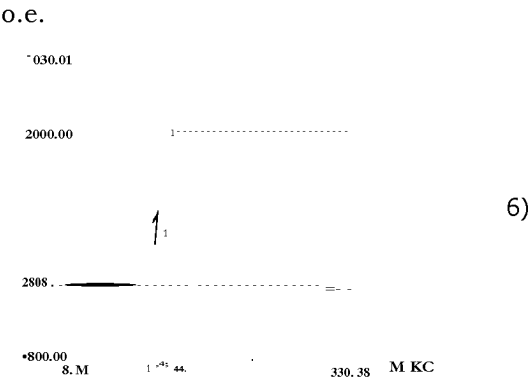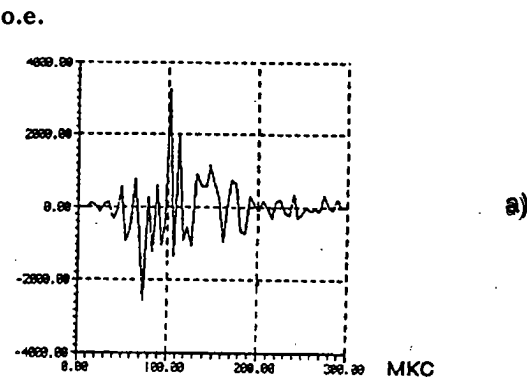
HMIUIwTy,ga КОТОрОГО npOHOplIHOHanbHa BeJI P4HHe BpeMeHHOLI 3agep3KKH. Bblxo,q ,LI3MepHTCnH BpeMeHHbIX HHTepBanOB 9TIeKTpH^{T}IeCKH COnpA2KCH C HHJ KaTOpOM 7.

TaIHM o6pa3oM, Ha OCHOBaHHH BbIIIIelI3nOIKeHHOГO 3as rmeMas COBOKynHOCTb npH3HaKOB В cnoco6e H ycTpoilCTBe 17O3BOn$CT peIIIHTb 3aJ a^{I}ly, a HMeHHO CHH3HTb OnaCHOCTb HaHeCeHHA TpaBMbI nau, eHTy npH na3epHOH o6pa6orKe TBepgbvc TKaHeH 3y6a npH neueHHH KapHeca H npoTe3HpoBaHHH.
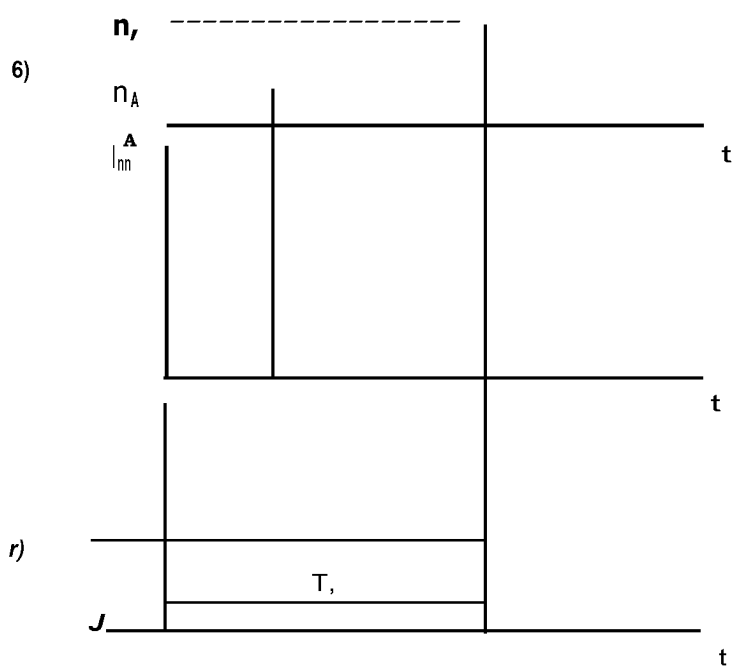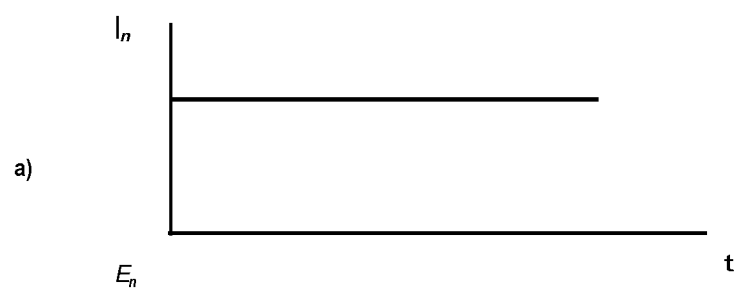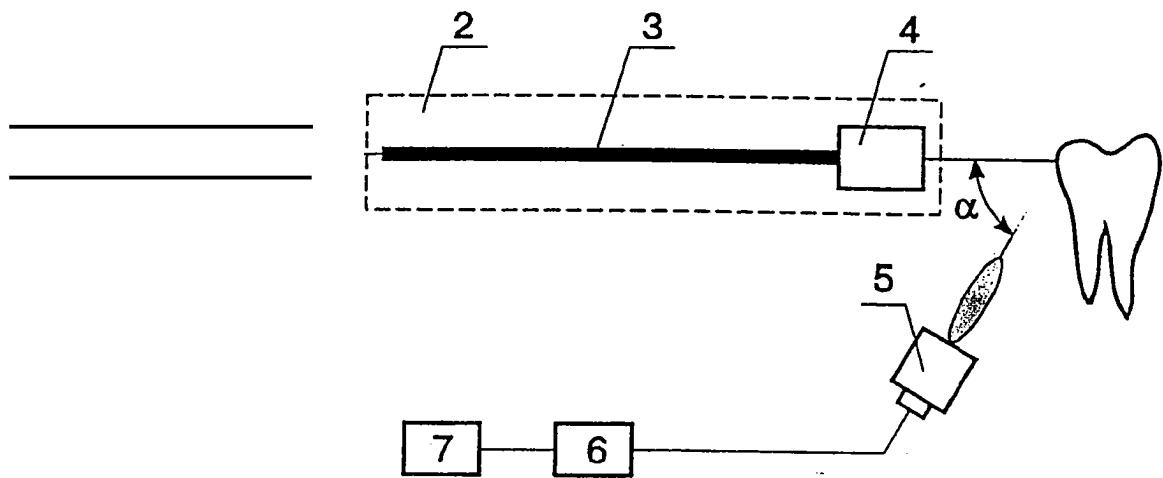
Claims [OopMyna x3o6peTeHHsr]:

1. Cnoco6 o6pa6oTKn TBep)bIX TKaHe&i 3y6a na3epHbIM K3nytleHHeM, sn iiouaioBugi B03AC CTBHe Ha TKaHH 3y6a na3epHbIM HMnynbcoM, oTnHLIaiOIIj II CH TeM, **uTo** perncTpHpyIOT aKyCTa lCCKHK HMnynbC. B03HHKa7On;HIYi npH B3aHMO)Iei cTBHH H3ny*aeHHH c TKaHbIO, no nHKOBOi airuiw iyjje KOTOpOPO onpeirmnoT Tnn o6pa6aTmBaeMo2 TKaHH.

2. Cnoco6 **no n.1,** oTnn'lalonvelftCH TeM, LITO aKyCTH^{L}IeCK1II HMnynbC pCIHCTpHpylOT B jjnana3oHe 3ByKOBbIK ^{L}IaCTOT **85 95** Krij.

3. Cnoco6 no n.l, OTnn^{L}iaJon;uiICSI TeM, HTo OjjHOBpeMCHHO C perHCTpaIjHeik aKyCTH^{L}ICCKOPO HMIIynbCa H3MepHIOT BpeMeHHyio 3ajjepitхy MeicJ y na3epHbIM H aKyCTH^{i}IeCKHM nMnynbCaMn, nO Benn^{L}IHHe KOTOpOLI yTO^{L}IHHIOT Tin 06pa6aTblBaeMOId TKaHH.

4. YCTpoi c'rBo jjni **o6pa6oTKn** TBepjjbzX TKaHei 3y6a na3epHbIM H3nyueHneM, cocToHnRee B3 noenejjoBaT2nbHo pacnonoiKeHHbix BJ;Onb OIITH^{L}IeCKO2 OCH HMnynbCHOPO na3epa H cpejjcTBa) OCTaBKM i3TlyueHH51 OT na3epa K 3y6y, BXOjj KOTOpOrO OnTH^{L}ICCKH COnpi7KeH C BbIXOJjOM na3epa, oTnnualonjeecH 'rem, ^{L}ITO yCTpO2CTBO CO) CpхiHT aхycTH^{L}Iecxn171 npMCMHHK H H3MepHTCnb nHKOBOLI aMnnnTyjjbI 3nCKTp1^{L}ICCKHX MM IynbCOB, BXOjj KOTOpOPO 3nCKTpH^{L}ICCKH COnpHjKCH C BbIXO,J OM aKyCTH^{L}IeCKOPO IlpneMHHKa, a BbIXOjj 3neKTp11^{L}ICCKH COnpHnKeH C BK0140M ycTpoilCTBa HHjjHKaU,HH, npntieM aхycTnuec ii npHeMHHK yCTaHOBneH TaK, ^{L}ITO HanpaBneHHe ero MaKCI1ManbHOLI LIyBCTnBTenbHOCTH COCTaBnHCT C HanpaaneHHeM OnTn^{L}IeCKOLI OCH Ha BbIXOjje cpejjcTBa jjOCTaBKH 1113nyueHHH OT na3epa K 3y6y yron a, yjjOBneTBOpHIOnjivl ycnOBHIO II ° $_{d < Ss}$ ° **5.** YcTpOllCTBO no n.4, oTnnuaionjeec i TCM, ^{L}ITO BXOjj 113MCpHTCnH nHKOBOYi aMIITIHTyjjbl 3neKTpH^{L}IeCKHX HMnynbCOB 31lCKTpH^{L}IeCKH COnpH?KeH C BbIXOjjOM aKyCTH^{L}ICCKOPO IlpneMHHKa Liepe3 6noK CneKTpanbHOPO npeo6pa3oBannn n **4** HflbTpaljnH C nonoco I npOnyCKaHHH **85 95** KN.

6. YcTpoiiCTBO 110 n.4, oTnn^{g}alonjeecH TeM, ^{L}ITO OHO) OHOTIHHTenbHO COjjepiKHT (DoTOpePHCTpaTOp H 6nox H3Mepenrin BpeMennbix HHTepBanOB, npnueM BXOjj (4OTOpePHCTpaTOpa OHTH^{L}IeCKH colipHxieH C BbIXO) OM na3epa, a BbIXOjj 3neKTpH^{L}IeCKH COnpH?KCH C OjjHHM 113 BXOROB 611lOKa 1I3MepeHHH BpeMCHHbIX 11HTepBaTIOB, BTOpOYI BXOjj KOTOpOPO 3neKTpH^{L}ICCKH COnpH}KeH C BbIXO) OM aKyCTH^{L}IeCKOPO npneMHHKa, a BbIXOjj 3neKTpH^{L}IeCKH conpHxcen c BXOJZOM yCTpOLICTBa HHJ nKauwH.
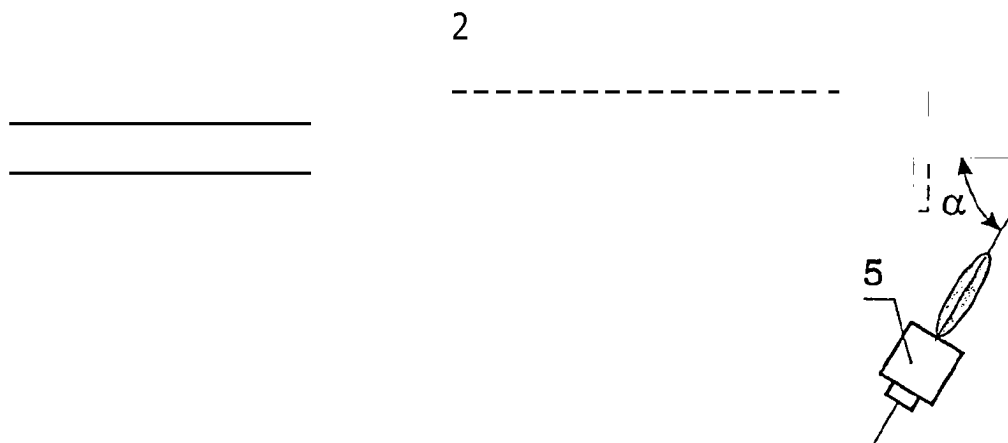
Drawing(s)   [~lepTemn]:

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